1987 ANNUAL REPORT

The Coordinating Committee of Maritime Electric Utilities

presented to

The Council of Maritime Premiers

Maritime Electric Company,Limited

New Brunswick Power

Nova Scotia Power Corporation.

THE COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

1987 ANNUAL REPORT

TO

THE COUNCIL OF MARITIME PREMIERS

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1988 08 18

Premier J.M. Buchanan
Premier F.J. McKenna
Premier J.A. Ghiz

Sirs:

It is with pleasure that we, the members of the Co-ordinating Committee of Maritime Electric Utilities, submit our Annual Report.

The Co-ordinating Committee of Maritime Electric Utilities (CCMEU), having now completed its seventh full year of operation, feels that its efforts are contributing to the achievement of full co-operation among the region's electric power utilities.

We also believe that CCMEU serves a useful role in identifying, discussing and quantifying the benefits of such co-ordination for the Council of Maritime Premiers.

Respectfully,

J.H. Reynolds
Chairman, CCMEU
Maritime Electric Company, Limited

Frank MacLoon
Member, CCMEU
New Brunswick Power

T.F. MacDonald
Secretary, CCMEU
Nova Scotia Power Corporation

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1.0 SUMMARY OF FINDINGS

1.1 General

The committee feels that the terms of reference provided by the Council continue to be satisfactory and will result in the ability to provide valuable information to both the Council and the Utilities in matters relating to the efficient regional development and operation of the Maritime Electric Power Systems.

The individual Operating, Planning and Research and Development Subcommittee reports provide an overall appreciation of Committee results.

Highlights from these subcommittee reports reveal the following:

1.2 Regional Operating Subcommittee Report

Customers in the Region continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Slightly over one billion kilowatt hours of energy worth 34 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 15.5 million dollars. These values are slightly higher than in 1986, but lower than those of former years, due to the dramatic fall in oil prices.

Major efforts towards providing more efficient operation through upgrading or replacing energy control facilities were completed in all three utilities during the year.

The coordination of maintenance activities to provide economies of operation and improved reliability continued during the year.

Progress was made in the ongoing endeavor to improve overall utilization of existing electrical energy resources.

1.3 Regional Planning Subcommittee Report

The report summarizes the regional load forecast and load resources review for the Maritime Utilities.

The Regional Load Forecast is based on the forecast of the individual utilities. The past year has seen a moderation of the strong growth of the previous two years in domestic sales at 3.8%, a moderate growth in commercial sales at 4.4% and a strong growth in industrial sales at 6.4%. Total sales have grown 5.0% over the past year. Average growth rates over the years 1987/88 to 2001/2002 are expected to be 3.0% for energy and 3.1% for peak demand.

From a reliability viewpoint, the Load Resources Review indicates that there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's, assuming that currently-planned additions are undertaken.

1.4 Regional Research and Development Subcommittee Report

The Subcommittee reports greatly-improved dissemination of R & D information within the utilities as a result of the communications structure developed by the Subcommittee. Pooling of R & D resources and results is made whenever such activity will benefit the utilities in the region.

The main areas of R & D in the region in 1987 related to the following:

- alternate fuels for oil-fired plants
- reduction in acid-gas emissions
- plant life extension and efficiency improvement
- research into new energy markets

A review of current R & D activity reveals the following projects in each utility:

1.4.1 New Brunswick Power

- Dalhousie Unit No. 1 - Orinoco Fuel Project demonstration
- Circulating fluidized bed demonstration project at Chatham
- Distributed-mixing coal burner development
- Development of an on-line performance monitoring system
- Retrofit variable-speed drive to an induced-draft fan
- Coal-liquid mixture combustion - Charlottetown plant
- Scheduling of major thermal power plant equipment inspections
- Electrical testing of thermally-deteriorated converter transformer to determine remaining electrical strength
- Lightning ground flash density measurements in Canada
- Field trials of a galloping-control device for bundled-conductor lines
- High Voltage DC working group
- Application of herbicides to control unwanted vegetation on transmission right-of-way, capsule evaluation program
- Heat pump dehumidification drying in a fish smokehouse

1.4.2 Nova Scotia Power Corporation

- Accelerated material evaluation of polymer insulators for transmission lines
- Application of ion chromatography to chemical analysis of the steam/water cycle
- Circulating fluidized bed feasibility study
- Coal-liquid mixtures conversion feasibility study
- Control of distribution line galloping
- Evaluation of CCA-PEG treated Scotch pine poles
- Field testing of distribution equipment and line materials in a marine atmosphere
- Field testing of insulators and associated equipment on 25 kV distribution lines in a coastal salt environment

- Marginal cost-based peak load pricing and load control study
- Nova Scotia add-on plenum heater experiment
- Performance of preservative-treated white and red spruce poles
- Test burn of Nova Scotia coal and limestone at Chatham Circulating Fluidized Bed
- Development of an effective fish bypass at Hell's Gate hydro-electric station headpond
- Fish diversion studies at Annapolis Tidal Generating Station
- Herbicide capsule evaluation

1.4.3 Maritime Electric Company Limited

- Wind test site, North Cape, P.E.I.
- Coal-liquid mixture combustion - Charlottetown, P.E.I.
- Farm losses resulting from electric service interruptions

2.0 THE COMMITTEE

The membership of the Committee shall consist of one representative, and an alternate, from each of the electric utilities. Observers delegated by each Provincial Government and the Federal Government may attend Committee meetings.

2.1 Committee Membership

Mr. J.H. Reynolds, Chairman
President and C.E.O.
Maritime Electric Company, Limited
P.O. Box 1328
Charlottetown, P.E.I.
C1A 7N2

Mr. Frank MacLoon, Member
Executive Vice President,
New Brunswick Power
515 King Street
Fredericton, New Brunswick
E3B 4X1

Mr. T.F. MacDonald, Secretary
Vice President-Planning
Nova Scotia Power Corporation
P.O. Box 910
Halifax, Nova Scotia
B3J 2W5

2.2 Observers To The Committee

G. Redmond,
Deputy Minister, Cabinet Secretariat
P.O. Box 1617
Halifax, Nova Scotia
B3J 2Y3

Douglas Cameron
Deputy Minister
Dept. of Energy & Forestry
P.O. Box 2000
Charlottetown, P.E.I.
C1A 7N8

NEW BRUNSWICK REPRESENTATIVE:
To be appointed by the
New Brunswick Government

E. Martin Warnes
Director Electrical Energy
Technology
Energy, Mines and Resources Canada
580 Booth Street
Ottawa, Ontario
K1A 0E4

2.3 Alternate Committee Members

C.T. Flynn (Alt. Member)
Director, Strategic Development &
External Marketing
New Brunswick Power
515 King Street
Fredericton, New Brunswick
E3B 4X1

L.J. Sweett (Alt. Member)
Vice President - Customer Services
Nova Scotia Power Corporation
P.O. Box 910
Halifax, Nova Scotia
B3J 2W5

P.H. Newcombe (Alt. Member)
General Manager
Maritime Electric Company Ltd.
P.O. Box 1328
Charlottetown, P.E.I.
C1A 7N2

2.4 Alternate Observer

Gerry D. Mendleson
Director, Legislative Affairs
Cabinet Secretariat
P.O. Box 1617
Halifax, Nova Scotia
B3J 2Y3

2.5 Committee Terms of Reference

The responsibility, structure, and operation of the Committee is intended to ensure a continuing high degree of cooperative effort among the electric utilities of New Brunswick, Nova Scotia, and Prince Edward Island in the development and operation of an economic and efficient interconnected regional electric power system.

Responsibilities of the Committee shall include:

1) Development of coordinated load growth forecasts on an annual basis.

2) Identification and evaluation of regional electric utility development opportunities.

3) Development of optimum coordinated short and long range utility expansion plans.

4) Coordination of operations of the three utility systems with the objective of minimizing total regional generation costs, and improving security of supply.

5) Coordination of electric energy research and development, conservation and related activities of a regional nature.

6) Provision of a regional focus for operations coordination with neighbouring utility systems.

7) Such matters as may be referred to the committee by the Council.

The Committee shall meet at least quarterly with locations normally rotating among the three provinces.

The Committee shall submit a written report at least annually to the Council of Maritime Premiers.

2.6 Subcommittee Membership

2.6.1 Regional Operating Subcommittee

Chairman: P.H. Newcombe
Maritime Electric Company, Limited

Members: W.A. Patterson
New Brunswick Power

W.V. Wallace
Nova Scotia Power Corporation

2.6.2 Regional Planning Subcommittee

Chairman: J.L. Boomhower
Maritime Electric Company, Limited

Members: R.W. Brown
Nova Scotia Power Corporation

Ed Haggerty
New Brunswick Power

2.6.3 Regional Research and Development Subcommittee

Chairman: J. Kiuru
Nova Scotia Power Corporation

Members: J.A. Lea
Maritime Electric Company, Limited

Vince Corey
New Brunswick Power

1987

ANNUAL REPORT

REGIONAL OPERATING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

Members:

P. H. Newcombe - Chairman	MECL
W. A. Patterson	NBEPC
W.V. Wallace	NSPC

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3.1 EXECUTIVE SUMMARY

This is the seventh annual report of the Regional Operating Subcommittee to the Coordinating Committee of Maritime Electric Utilities and describes the subcommittee's activities during 1987.

Customers continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Just over one billion kilowatthours of energy worth 34 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 15.5 million dollars. These values are slightly higher than 1986 but lower than those of former years due to the dramatic fall in oil prices.

Major efforts towards providing more efficient operation through upgrading or replacing energy control facilities were completed in all three utilities during the year.

The coordination of maintenance activities to provide economies of operation and improved reliability continued during the year.

Progress was made in ongoing endeavor to improve overall utilization of existing electrical energy resources.

3.2 RECOMMENDATIONS

It is recommended that the Regional Operating Subcommittee continue with the proposed activities for 1988 as described in Section 3.5.

3.3 TERMS OF REFERENCE

The Regional Operating Subcommittee shall consist of at least one member from each of the utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Operating Subcommittee shall undertake to do the following:

3.3.1 Monitor and report on activities within each utility with respect to changes in control and operating policy and practice.

3.3.2 Review, at least annually, the operating policies and practices in effect in the different utilities and determine if there are benefits of intergrating different operational aspects of the utilities.

3.3.3 Endeavor to determine the optimum dispatch of existing electrical energy resources on a regional basis including imports from outside the region and where beneficial, exports and report on any actions that the Subcommittee thinks could be beneficial to the utilities individually or collectively.

3.3.4 Attempt to identify and report on possible savings due to allocation of hydro on a regional basis and possible methods of sharing benefits from such allocation.

3.3.5 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to CCMEU members and other Subcommittee members.

3.3.6 Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

3.4 ACHIEVEMENTS FOR 1987

3.4.1 Benefits from Interconnected Operation

Better service is provided to customers and at a lower cost through the interconnected operation of the three member utilities.

By agreement a member can call upon the generation reserves of another utility in the region for assistance in coping with a sudden emergency such as the tripping of a large generator or with a longer term problem such as a disruption in fuel supply or a major problem with a generating unit resulting in a lengthy outage. Through sharing reserves the total amount of generation that is required on-line in the region at any given time is reduced and therefore the cost of providing reserve as well.

The largest saving to customers accrues from the interchange of energy between members on an hourly, weekly and monthly basis. These transactions are arranged whenever one utility has surplus energy which can be produced at a cost lower than the production cost of a neighboring utility. The benefit of the transaction is shared between the seller and the purchaser.

The volume of energy transactions between the members totalled 1.06 billion kilowatthours in 1987. The transactions had a total value of 34.01 million dollars and provided a benefit of 15.5 million dollars to the members. These figures are up slightly over 1986 but down from previous years which is largely due to the fall in oil prices during 1987 and a reduction in the resale of coal fired energy from Nova Scotia.

INTERCONNECTION TRANSACTIONS

for period January 1, 1987 to December 31, 1987

Energy Transactions Between	Volume of Interchange (MWh)	Total Value of Transactions ($)	Benefits of Transactions ($)
N.B. Power to N.S. Power Corp.	578,700	14,600,000	6,000,000
N.S. Power Corp. to N.B. Power	1,600	110,000	24,000
N.B. Power to Maritime Electric Co.	482,000	19,300,000	9,500,000
	1,063,100	34,010,000	15,524,000

Benefits of Dalhousie participation agreement not included.

3.4.2 Generation Maintenance Scheduling

Generation maintenance scheduling plans were exchanged by the members and reviewed to allow production costs to be reduced and to ensure that adequate generation reserves are maintained.

3.4.3 Transmission System Maintenance

Personnel from the three member utilities meet annually to review common items of concern, provide coordination and future cooperation in relation to transmission maintenance. Specific items addressed included transmission line inspection practices, insulator failures, life of paint and corrosion of terminal equipment, PCB decontamination and other electric apparatus failures. Information on spare parts and specialized equipment is regularly updated.

During the year suggested governing principles covering emergency assistance arrangements were exchanged as well as formal Mutual Assistance Rosters. These Rosters identify contacts as well as personnel and equipment which could be made available by one member utility to another to provide emergency assistance in restoring service. During the year assistance was provided to Bermuda Electric Light Company, Ltd. and they are interested in being part of the Mutual Assistance Programme.

3.4.4 Dispatch Facilities

In relation to system operations the major effort in all three member utilities during the past year was near completion of replacement of energy control facilities to accommodate system growth. These projects are providing more efficient operation of generation, transmission and distribution systems.

Maritime Electric Co. Ltd. completed installation of a new computer based SCADA (Supervisor Control and Data Acquisition) system at the Charlottetown Control Centre. The system was commissioned in September 1987. A backbone communications system provided by a fibre optic transmission line between Charlottetown and Bedeque was commissioned in June. Existing UHF radio equipment will be reconfigured to provide communications to outlying areas.

Nova Scotia Power completed construction of a new Energy Control Centre at Ragged Lake Research and Business Park in Halifax. The centre provides province-wide control of generation and transmission from new SCADA equipment and an EMS (Energy Management System) which went in-service in October, 1987. Control of the distribution networks in the Halifax area will be provided from the dual function centre in 1988.

Personnel responsible for the Development of the Control Centres met several times during the year to exchange information in areas of mutual benefit.

3.4.5 Optimum Dispatch of Electrical Energy Resources

During 1985 a Thermal Generation Working Group established by the Regional Operating Subcommittee developed standardized methods for determining electrical production costs for use in the interchange of energy. Difficulties were encountered in applying the methods to the individual utility systems due to differences in cost accounting e.g., one utility might have an historical record of particular costs on an individual generating unit basis while another utility recorded these costs on a total station basis. Efforts of the Working Group during 1986 focused on accommodations these differences and standardizing where possible. The new energy costing system was put in effect on 1 July 1987 by NBEPC and NSPC. Maritime Electric followed suit in early 1988.

3.4.6 Interconnection Facilities

No changes were made to the facilities which directly interconnect the three utilities.

3.5. PROPOSED ACTIVITIES FOR 1988

3.5.1 Continue to evaluate and report on the annual benefits from interconnected operation.

3.5.2 Continue to exchange maintenance schedules of generation and major transmission facilities to enhance operating efficiency.

3.5.3 Update information exchanged on spare parts and apparatus for transmission facilities and specialized test equipment.

3.5.4 Continue work on sharing of tie line regulation.

3.5.5 Continue efforts associated with the joint dispatch of hydro.

ANNUAL REPORT

OF THE

PLANNING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JUNE 1988

Members:

J.L. Boomhower - Chairman, MECL

R.W. Brown NSPC

D.G. Hayward NB Power

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4.1 SUMMARY

This is the seventh annual report of the Planning Subcommittee to the Coordinating Committee of the Maritime Electric Utilities. The report summarizes the Regional Load Forecast and the Load Resource Review.

The Regional Load Forecast is based on the forecast of the individual utilities. The past year has seen a moderation of the strong growth the previous two years in domestic sales at 3.8%, a moderate growth in commercial sales at 4.4% and a strong growth in industrial sales at 6.4%. Total sales have grown 5.0% over the past year. Average annual growth rates over the years 1987/88 to 2001/2002 are expected to be 3.0% for energy and 3.1% for peak demand.

The Load Resources Review indicates that, from a generation reliability viewpoint, there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's. The results are given in Table 9 and Figure 1.

4.2 RECOMMENDATIONS

It is recommended that the Planning Subcommittee continue with the proposed activities for 1988 as outlined in section 4.6 of this report.

4.3 TERMS OF REFERENCE

The Regional Planning Subcommittee shall consist of at least one member from each of the utilities in the Maritime Region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Planning Subcommittee shall, through whatever mechanism it deems necessary, Task Force appointment, consultant acquisition, etc., (subject to approval of CCMEU) undertake to do the following:

1. Prepare a load forecast showing the power and energy requirements of the region for approximately two decades. This load forecast shall be reviewed and updated, if necessary, annually.
2. Obtain the plans of the individual utilities and combine them to prepare a regional load-resource balance.
3. Identify possible benefits through short term deferral and/or advancement of provincially scheduled units and will so notify the CCMEU.
4. (a) Considering all feasible regional alternatives, prepare an optimum long term generation expansion plan (including major transmission when necessary) without regard to individual utility boundaries and without regard to proposed provincial units which have not been committed to construction. The development of any optimum expansion plan will always start with the then existing and committed facilities of the three Systems.

4.3 TERMS OF REFERENCE (Cont'd)

(b) Prepare a report comparing the optimum regional expansion plan with the sum of the individual expansion plans and report its findings to the CCMEU.

5. Periodically assess the potential for imports from outside the region or exports outside the region, the constraints imposed by existing transmission system limitations and will recommend the need or otherwise for studies of incrementing transmission capacity.

6. Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

4.4 WORK PROGRAM FOR 1987

The following is the 1987 work program as proposed in last year's Annual Report:

1. Produce a regional load forecast.

2. Produce the load resource balance for generation existing and under construction.

3. List potential future generation options available to the Maritime utilities.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report on the subcommittee annual activites.

4.5 ACHIEVEMENTS FOR 1987

4.5.1 Regional Load Forecast

The individual Maritime utilities forecasts have been combined in Table 1 to give the Regional Load Forecast. Average annual compound growth rates for the period 1987/88 to 2001/2002 are 3.0% for energy and 3.1% for peak demand. The long term growth is slightly higher than last year with 2000/2001 presently forecast at 5573 MW/30080 GWh as compared to 5260 MW/28292 GWh.

Since the individual utility annual peak loads do not necessarily all occur at the same hour of the year, their arithmetic sum is usually greater than the annual peak load demand of the integrated regional system. A projection of future hourly loads of each of the three utilities has been combined to obtain the total peak load forecast for the region. The results are shown in Table 2.

Table 3 summarizes the expected long term growth in energy sales by sector. The domestic sector is forecast to grow at 3.0%, the commercial sector at 2.8%, the industrial sector at 2.9% and total sales at 2.9% between 1987/1988 and 2001/2002.

Tables 4 and 5 show respectively the regional monthly coincident peak demand and energy forecasts. The month of maximum peak demand and the month of maximum energy demand continues to be January.

4.5 ACHIEVEMENTS FOR 1987

4.5.1 Regional Load Forecast (Cont'd)

With all the uncertainties in the future variables which could effect the growth in electricity consumption, the forecast must be frequently updated, and can only act as a guide to utility planning.

4.5.2 Regional Load and Resources Review

The Load and Resource Review is intended to examine the ability of the regional utilities generating facilities to reliably meet the anticipated future demands of the customers.

4.5.2.1 Load Requirements

To allow for maintenance and account for forced or unexpected outages of generating units, the total generating capacity installed in the region must be greater than the regional load. This excess of generation over expected load is known as reserve. The load requirement to be met in the region consists of the forecast firm load plus a specified amount of reserve.

4.5.2.2 Resources

The generation resources are comprised of the total generation capabilities from both existing generating stations and those under construction. Listings of the resources are given by Province in Tables 6, 7 and 8.

4.5.2.2 Resources (Cont'd)

The resources consist of a mix of hydro, coal fired thermal, oil fired thermal, gas turbine and nuclear generation.

4.5.2.3 Reserve Criterion

For the purpose of this regional examination, the following criterion has been applied to the combined NB, NS and PEI systems.

The reserve criterion requires that the total generating capacity available in each month be able to supply the load during the peak hour of the month with a surplus equal to 20% of the forecast firm load or the capacity of the largest unit, whichever is larger. To meet this criterion thermal and hydro generating units are considered as having been fully maintained prior to the peak demand period and, therefore, available at their full rated capabilities.

Although this criterion is a reasonable guide for regional reliability of supply, the final decision on the exact timing of new capacity may also take into consideration the energy production capability of existing hydro and the potential for support from ties to external systems.

4.5.2.4 Regional Electrical Capability Assessment

A comparison is made between the generation resources and the load required for each month of the study period. A surplus or deficit in the capability to supply is determined.

This assessment requires that generation reserve is added to the peak forecast load to determine the total peak load that would have to be met. This total load is compared with the sum of the generation supplies available from hydro, nuclear and fossil units to determine the surplus or deficit. In doing this calculation all generating units are considered to be available at their full net rated capability as given in Tables 6, 7 and 8. The results of this assessment are presented in Table 9 and Figure 1.

The available storage water for hydro generation is regulated in a manner to maximize the benefits on the system.

The combined load resource balance of the NB, NS and PEI systems has been carried out for each month of the year. This report provides only details of the peak load month in each year, since this condition has been used to

4.5.2.4 Regional Electrical Capability Assessment (Cont'd)

define the system surpluses and deficiencies and hence indicates from a reliability viewpoint when new generation is required.

For the purposes of determination of the reserve requirements, the largest unit in the region is as follows:

1. Until 1991/92 - Point Lepreau at 405 MW
2. After 1991/92 - Point Lepreau at 635 MW

4.5.3 Regional Generation Alternatives

Previous analysis and reports have demonstrated that the combination of the individual utility plans have provided a near optimum solution to required generation expansion. No new analysis has been undertaken this year to define additional expansion plans.

The following, however, does indicate the potential generating resources available to the Maritime utilities.

4.5.3.1 Conventional Hydro

In New Brunswick a potential exists for new hydro-electric projects to be built on the Saint John River at Grand Falls and just downstream at Morrell and

4.5.3.1 Conventional Hydro (Cont'd)

that they be operated together to assure a guaranteed firm output. An appraisal of the integrated development indicates that a 300 MW generating station could be constructed at Grand Falls beside the existing 60 MW plant. This new plant would operate as a pump storage development utilizing the Morrell headpond as the lower basin. Water would be pumped from the Morrell headpond to the Grand Falls headpond during off peak periods. This water would be used for generation through the Grand Falls plant during peak demand periods of the day. The Morrell development would contain four generating units with a total capacity of 140 MW. Other possible new hydro generation and storage sites exist throughout New Brunswick. In Nova Scotia there are no major hydro projects left to be developed. There are no potential hydro sites in Prince Edward Island.

4.5.3.2 Tidal

There are two tidal projects which continue to exhibit some potential of becoming economically viable. Site B9 across the mouth of Cobequid Bay has a potential capacity of 5000 MW and A8 across the Cumberland Basin has a potential capacity of 1400 MW. Both sites are large with respect to the region, are economically dependent on substantial export and have a minimum 10 year engineering and construction lead time.

4.5 ACHIEVEMENTS FOR 1987

4.5.3.3 Nuclear

Nuclear power remains a potentially economically acceptable base load option.

4.5.3.4 Natural Gas

This is not currently available to the region and should it become available it would likely only be to provide a short term market for gas by burning it in units such as Coleson Cove, Courtenay Bay or Tufts Cove.

4.5.3.5 Coal

Coal power is potentially economic and financially attractive in both new units and in the conversion of existing oil-fired units. Nova Scotia has recently converted a 150 MW oil-fired unit at Point Tupper to coal and New Brunswick is studying the conversion of Coleson Cove from oil to coal-firing. Both Nova Scotia and New Brunswick are examining the potential for new coal-fired units. New Brunswick is in the final stages of commitment to a 400 MW unit to be located at one of three locations; Dalhousie, Belledune or Coleson Cove. Several projects have been undertaken to investigate the feasibility of burning coal more economically and cleanly through the use of technologies such as coal washing, coal-water mixtures and fluidized bed combustion. The large reserves of indigenous coal resources makes these options particularly important to investigate.

4.5 ACHIEVEMENTS FOR 1987

4.5.3.6 Load Management

In this document load management refers to efforts to manage customer load by action initiated by the utilities to move consumption from peak to off-peak periods. The large amount of peak shaving capability provided by the regions' hydro resources tends to minimize the advantage of load management. However, it continues to be investigated.

4.5.3.7 Conservation

The need for energy conservation continues to be a major concern of the Maritime Utilities and all practical forms of conservation are considered such as incentive programs and educational programs.

4.5.3.8 Other

Alternate energy sources such as wood, biomoss, solar, wind, fuel cells, etc. have been investigated as generation sources but, to date, have not been chosen by the utilities to supply base load requirements.

4.6 PROPOSED ACTIVITIES FOR 1988

The activities proposed for 1988 are a continuation of the present work:

1. Produce a regional load forecast.

2. Produce the load resource balance for generation existing and under construction.

3. List potential future generation options available to the Maritime utilities.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report on the subcommittee annual activites.

TABLE 1

MARITIME ELECTRIC UTILITIES

REGIONAL LOAD FORECAST

Fiscal Year	System Net Gwh[1)]	Peak Hourly MW
87-88	20375	3788 Actual
88-89	20801	3932
89-90	22031	4128
90-91	23358	4328
91-92	24184	4477
92-93	24884	4623
93-94	25475	4763
94-95	26165	4903
95-96	26846	5044
96-97	27521	5181
97-98	28196	5324
98-99	28831	5451
99-00	29457	5573
00-01	30080	5697
01-02	30700	5819

Total Period Averge Annual Growth Rate:

Gwh = 3.0%

MW = 3.1%

1) Includes System Losses

TABLE 2

MARITIME ELECTRIC UTILITIES

COINCIDENT PEAK LOAD FORECAST (MW)[1)]

FISCAL YEAR	N.B.	N.S.	P.E.I.	TOTAL	REGIONAL DIVERSITY	COINCIDENT REGIONAL LOAD
87-88	2336	1607	119	4062	274	3788 ACTUAL
88-89	2321	1531	124	3977	45	3932
89-90	2410	1639	127	4176	48	4128
90-91	2501	1749	129	4379	51	4328
91-92	2587	1812	130	4529	52	4477
92-93	2675	1871	132	4678	55	4623
93-94	2757	1927	134	4818	55	4763
94-95	2839	1987	136	4962	59	4903
95-96	2920	2046	138	5104	60	5044
96-97	2998	2105	140	5243	62	5181
97-98	3079	2166	141	5386	62	5324
98-99	3144	2227	143	5514	63	5451
99-00	3204	2290	145	5639	66	5573
00-01	3262	2355	146	5763	66	5697
01-02	3321	2418	148	5887		
Average Annual Compound Growth Rate %	2.5	3.0	1.6			3.1

1) Net System Firm Peak Load plus Interruptible Load

TABLE 3
MARITIME ELECTRIC UTILITIES
SALES FORECAST SUMMARY
(GWH)

FISCAL YEAR	DOMESTIC	COMMERCIAL	INDUSTRIAL	TOTAL
81-82	4226	3977	5679	13882
82-83	4416	4042	4988	13446
%	4.5	1.6	-12.2	-3.1
83-84	4791	4195	5871	14857
%	8.5	3.8	17.7	10.5
84-85	5159	4376	6323	15858
%	7.7	4.3	7.7	6.7
85-86	5715	4582	6008	16305
%	10.8	4.7	-5.0	2.8
86-87	6222	4709	6854	17785
%	8.9	2.8	14.1	9.1
87-88	6461	4918	7291	18670
%	3.8	4.4	6.4	5.0
01-02	9765	7291	10819	27875
%	3.0	2.8	2.9	2.9

% are per annum

TABLE 4

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT PEAK DEMAND FORECAST (MW)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1988/1989	3086	2932	2740	2561	2593	2680	2911	3315	3724	3932	3868	3539
1989/1990	3204	3034	2830	2641	2674	2772	3066	3483	3918	4128	4066	3723
1990/1991	3423	3234	3018	2818	2854	2959	3230	3661	4121	4328	4266	3914
1991/1992	3534	3327	3100	2891	2928	3043	3333	3777	4259	4477	4416	4053
1992/1993	3646	3424	3186	2953	3002	3127	3435	3896	4403	4623	4563	4189
1993/1994	3740	3503	3253	3019	3060	3196	3523	3995	4528	4763	4704	4316
1994/1995	3860	3602	3340	3090	3131	3283	3632	4118	4680	4903	4847	4447
1995/1996	3969	3694	3422	3162	3203	3367	3733	4233	4818	5044	4987	4576
1996/1997	4075	3787	3503	3231	3276	3448	3833	4347	4955	5181	5126	4705
1997/1998	4186	3883	3589	3305	3350	3535	3936	4463	5095	5324	5268	4835
1998/1999	4285	3971	3670	3376	3423	3614	4031	4568	5220	5451	5394	4952
1999/2000	4382	4059	3751	3449	3497	3695	4124	4672	5340	5573	5517	5066
2000/2001	4480	4147	3802	3521	3569	3776	4216	4776	5459	5697	5641	5180
2001/2002	4578	4236	3913	3594	3642	3857	4311	4882	5582	5819	5762	5291

TABLE 5

MARITIME ELECTRIC UTILITIES

MONTHLY ENERGY FORECAST (GWH)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1988/1989	1739	1624	1488	1453	1465	1502	1661	1818	2078	2223	2011	2039
1989/1990	1807	1679	1538	1499	1510	1552	1747	1913	2187	2334	2117	2148
1990/1991	1932	1793	1644	1601	1613	1660	1844	2013	2303	2453	2230	2272
1991/1992	2008	1861	1703	1658	1670	1720	1908	2080	2387	2538	2305	2346
1992/1993	2069	1914	1746	1700	1714	1766	1964	2142	2460	2617	2377	2415
1993/1994	2121	1956	1782	1733	1747	1804	2011	2194	2527	2683	2439	2478
1994/1995	2182	2007	1826	1773	1788	1848	2067	2256	2600	2759	2509	2550
1995/1996	2240	2056	1869	1814	1828	1894	2122	2314	2673	2835	2579	2622
1996/1997	2299	2106	1912	1855	1869	1938	2177	2374	2745	2908	2647	2691
1997/1998	2357	2157	1955	1896	1912	1984	2231	2433	2816	2982	2713	2760
1998/1999	2411	2204	1999	1937	1953	2028	2282	2488	2882	3048	2775	2824
1999/2000	2463	2252	2041	1979	1995	2072	2334	2542	2945	3113	2835	2886
2000/2001	2515	2299	2084	2020	2037	2117	2385	2596	3008	3178	2894	2947
2001/2002	2568	2346	2127	2062	2079	2160	2434	2651	3070	3242	2953	3008

TABLE 6

GENERATING STATION CAPABILITIES - NET MEGAWATTS[1] (MW)
EXISTING AND UNDER CONSTRUCTION
IN NEW BRUNSWICK

Hydro			Thermal			
Mactaquac	1	110	Grand Lake			
	2	110		5	5	
	3	110		6	5	
	4	116		7	15	
	5	113		8	57	
	6	113				
Beechwood	1	36	Chatham	1	9	
	2	36		2	20	
	3	41				
			Courtenay Bay	1	45	
Tobique	1	10		2	12	
	2	10		3	99	
				4	99	
Grand Falls	1	15				
	2	15	Dalhousie	1	102	
	3	15		2	183	2)
	4	15				
			Coleson Cove	1	335	
Milltown		4		2	310	
				3	335	
Sisson		9				
			Lepreau Nuclear	1	635	3)
Musquash		5				
			Moncton	1	22	
			Grand Manan		3	
Total Hydro		883 MW	Total Thermal		2291 MW	

1) Net megawatt values are derived by subtracting station service requirements from Gross Megawatt Capability.

2) Dalhousie unit 2 capability is reduced by 20 MW to recognize the joint ownership arrangement with Maritime Electric of Prince Edward Island.

3) Lepreau Nuclear available at 405 MW until Nov. 1, 1991 because of participation sales.

TABLE 7

GENERATING STATION CAPABILITIES - NET MW
EXISTING AND UNDER CONSTRUCTION
IN NOVA SCOTIA

HYDRO	MW	THERMAL	MW
Annapolis Tidal	17[1)]	Glace Bay	75
Avon	7	Lingan 1	152
Bear River	36	Lingan 2	154
Black River	20	Lingan 3	151
Dickie Brook	2	Lingan 4	151
Harmony	1	Point Tupper 2	152
Lequille	22	Trenton L.P.	40
Mersey	44	Trenton 5	144
		Trenton 6	150
Roseway	1	Tufts Cove 1	83
St. Margarets	10	Tufts Cove 2	98
Sheet Harbour	10	Tufts Cove 3	153
Tusket	3	Maccan	13
Wreck Cove	223	Combustion Turbines	205
TOTAL HYDRO	379	TOTAL THERMAL	1721

1) The 17 MW Annapolis Tidal unit is not included as firm capacity because of the cyclic nature of the tide.

TABLE 8

GENERATING STATION CAPABILITIES - NET MW IN PRINCE EDWARD ISLAND

THERMAL	MW
Charlottetown	19.0
	19.0
	9.5
	7.2
	7.2
	3.8
	1.4
Borden	22.0
	12.8
Summerside	10.1
Dalhousie 2 (NBEPC Purchase)	20.0
TOTAL	132.0

TABLE 9

MARITIME ELECTRIC UTILITIES

LOAD & RESOURCE REVIEW

(PEAK LOAD MONTH)

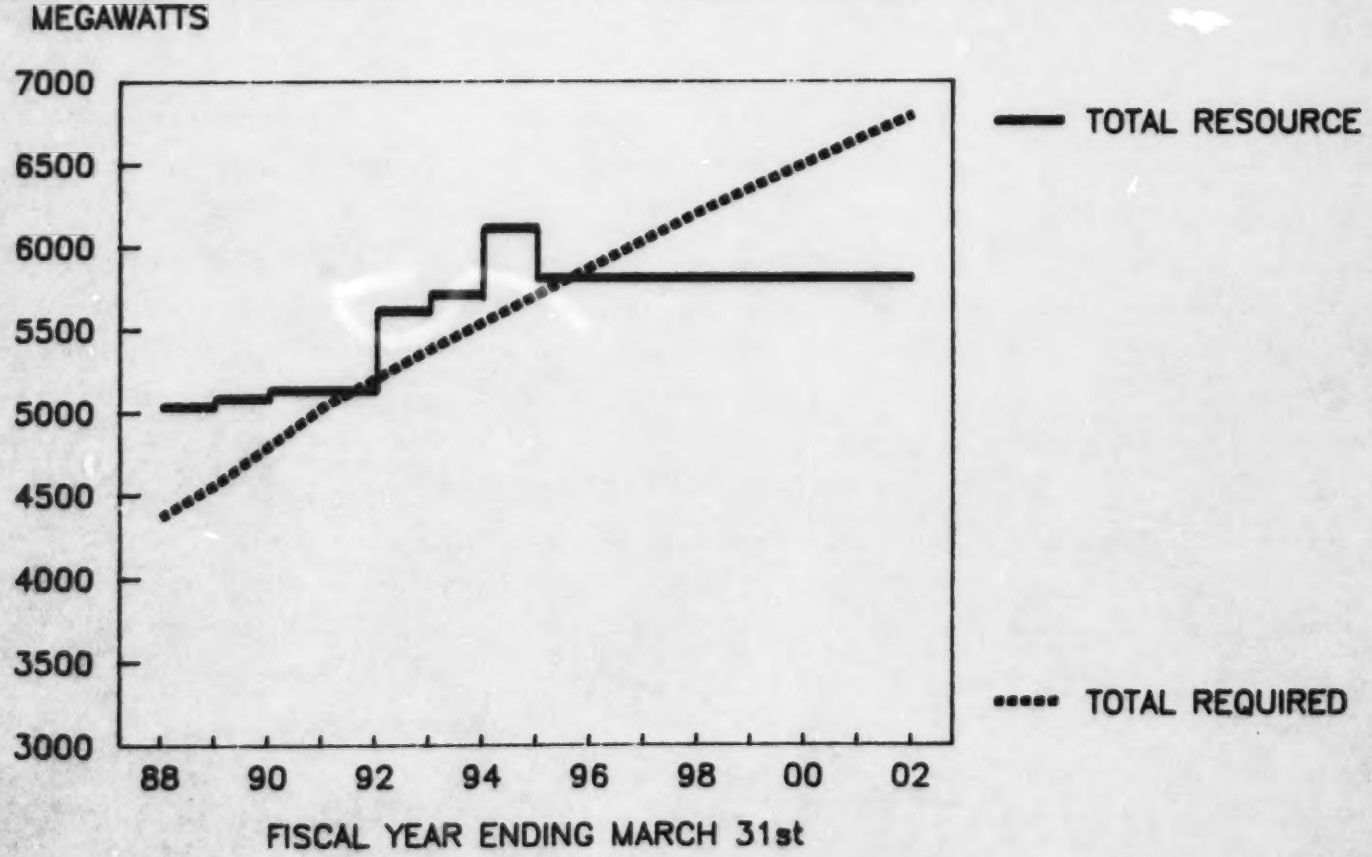
Fiscal Year Apr/Mar	Forecast Load 1) MW	Req'd Res. MW	Total Req. MW	Thermal Cap MW	Hydro Cap MW	Gross Nuclear Cap 2) MW	Nuclear Part. MW	Net Nuclear Cap MW	Total Resource MW	Surplus/ Deficit MW
1987/1988	3639.	725.	4364.	3359.	1262.	635.	230.	405.	5026.	662.
1988/1989	3798.	757.	4555.	3359.	1312.	635.	230.	405.	5076.	521.
1989/1990	3992.	796.	4788.	3359.	1362.	635.	230.	405.	5126.	338.
1990/1991	4190.	836.	5026.	3359.	1362.	635.	230.	405.	5126.	100.
1991/1992	4337.	865.	5202.	3509.	1462.	635.	0.	635.	5606.	404.
1992/1993	4481.	894.	5375.	3509.	1562.	635.	0.	635.	5706.	331.
1993/1994	4619.	921.	5540	3909.	1562.	635.	0.	635.	6106.	566.
1994/1995	4757.	949.	5706.	3909.	1263.	635.	0.	635.	5806.	100.
1995/1996	4896.	977.	5873.	3909.	1263.	635.	0.	635.	5806.	-67.
1996/1997	5031.	1004.	6035.	3909.	1263.	635.	0.	635.	5806.	-229.
1997/1998	5172.	1032.	6204.	3909.	1263.	635.	0.	635.	5806.	-398.
1998/1999	5297.	1057.	6354.	3909.	1263.	635.	0.	635.	5806.	-548.
1999/2000	5417.	1081.	6498.	3909.	1263.	635.	0.	635.	5806.	-692.
2000/2001	5539.	1105.	6644.	3909.	1263.	635.	0.	635.	5806.	-838.
2001/2002	5659.	1129.	6788.	3909.	1263.	635.	0.	635.	5806.	-982.

1) Net System Firm Peak Load

2) Includes Hydro Quebec Purchase

FIGURE I

MARITIME ELECTRIC UTILITIES
LOAD AND RESOURCE FOR PEAK LOAD MONTH



1987 ANNUAL REPORT

OF THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

MARCH 1988

Members:

J. Kiuru,- Chairman, NSPC
J. A. Lea MECL
C. T. Flynn NB Power

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5.1 EXECUTIVE SUMMARY

This seventh annual report of the Research and Development Subcommittee of the Coordinating Committee of Maritime Electric Utilities (CCMEU) covers the Subcommittee's activities during 1987.

The dissemination of R&D information is greatly improved as a result of the communications structure developed by the Subcommittee.

During 1987, the Subcommittee continued to carry out its mandate as set forth in its Terms of Reference (Section 5.3). A summary of the Subcommittee's achievements for 1987 is shown in Section 5.5 of this report.

The reports on the status of recently-completed and on-going R&D projects in the Maritime Electric Utilities are summarized in Section 5.7. Pooling of resources and results are made whenever such activity will benefit the utilities in the region.

The main areas of R&D in the region in 1987 related to the following:

(a) reduction in acid-forming gas emissions
(b) plant life extension and efficiency improvement
(c) alternate fuels for oil-fired plants
(d) research into new energy markets

5.2 INTRODUCTION

This is the seventh annual report of the Research and Development Subcommittee of the CCMEU which was formed in March 1982.

The summary of 1987 activities and the proposed activities for 1988 demonstrate a continuing increase and improvement in cooperative activity in which the benefits of R&D in the Maritime Electric Utilities are being shared among member utilities.

The contents of this report reflect the continued commitment by CCMEU and its member utilities to promote a regional approach to R&D within the Maritime Provinces.

5.3 TERMS OF REFERENCE

The Regional R&D Subcommittee shall consist of at least one member from each of the province-wide utilities in the maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

5.3 TERMS OF REFERENCE (Cont'd)

The regional R&D Subcommittee shall undertake the following:

5.3.1 Report on all electric utility-related R&D activities that are currently underway in the Maritime provinces.

5.3.2 Set up procedures whereby it is informed of any individual utility initiatives in R&D activity and attempt to achieve regional interest and participation in these activities.

5.3.3 Promote and implement the free exchange of R&D project information, procedures and results in order to share the results of all R&D projects undertaken by each utility. Recommend joint projects when such cooperation would benefit the region.

5.3.4 Review current and planned R&D expenditures by the member utilities and to recommend how maximum regional benefit can be obtained from these expenditures; this would include, but not be limited to the recommending against duplication of R&D effort.

5.3.5 Review the current and proposed R&D participation by member utilities in the CEA R&D program, and recommend actions which will enhance the regional benefit of these projects. This includes the possibility of joint proposals and joint bids on R&D contracts by member utilities.

5.3.6 Review R&D activity undertaken by utilities in Canada that is outside the umbrella of the Canadian Electrical Association and obtain the results of that activity for regional use.

5.3.7 Recommend to the CCMEU those R&D initiatives that the Subcommittee thinks should be taken within the region.

5.3.8 For projects which are identified by all member utilities to be of regional interest, but which cannot be funded by CEA and other R&D Funding, the Subcommittee shall request funding by the member utilities through the CCMEU.

5.3.9 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to members of the CCMEU and its other Subcommittees.

5.3.10 Submit a proposed work program and an expected budget requirement annually to the CCMEU as directed.

5.4 WORK PLAN FOR 1987

5.4.1 To continue to investigate areas where joint participation in R&D projects is possible.

5.4.2 To complete a review of the funding level of utility-related R&D projects undertaken or initiated within the region.

5.4 WORK PLAN FOR 1987 (Cont'd)

5.4.3 To continue to share results of individual R&D projects.

5.4.4 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal. The Subcommittee will continue to follow the work of this group in order to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized from the ongoing work.

5.4.5 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.4.6 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.5 SUMMARY OF ACHIEVEMENTS - 1987

5.5.1 Coal Beneficiation

The Subcommittee has continued to follow and promote developments in coal beneficiation studies being carried out by the Committee on Atlantic Coal in order to ensure maximum regional benefits and involvement.

5.5.2 R&D Project Review

The Subcommittee has continued to develop a summary of the nature and funding levels of all utility-related R&D Projects undertaken or initiated within the region.

5.5.3 Circulating Fluidized Bed

The Subcommittee continued monitoring the R&D activities at the Chatham, N.B. Circulating Fluidized Bed and other related studies in the Region.

5.5.4 Update of Regional R&D Activity Report

The Subcommittee continued to update its survey of R&D activities within the region in accordance with its terms of reference. The latest results are contained in Section 5.7 of this report.

5.6 PROPOSED ACTIVITIES FOR 1988

5.6.1 To continue to share results of individual R&D projects.

5.6.2 To continue to investigate and recommend areas where joint participation in R&D projects is possible.

5.6 PROPOSED ACTIVITIES FOR 1988 (Cont'd)

5.6.3 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.6.4 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal, to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized.

5.6.5 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.6.6 To investigate the possibility of including reports on utility-related research carried out by others in the Maritime area e.g. provincial research organizations.

5.7 STATUS OF CURRENT AND COMPLETED RESEARCH & DEVELOPMENT ACTIVITIES IN THE MARITIME ELECTRIC UTILITIES

5.7.1 NEW BRUNSWICK POWER

5.7.1.1 Dalhousie Unit No. 1 - Orinoco Fuel Project

Objective: Venezuela has extensive reserves of an extra heavy hydrocarbon known as Orinoco which has potential as a thermal plant fuel. The objective of this project is to develop and optimize the technology for the handling, storage and burning of this fuel in a commercial-sized unit such as Dalhousie Unit No. 1.

Description: NB Power has entered into an agreement with Lagoven, S.A., an operating subsidiary of Petroleos de Venezuela, S.A., the national oil company, to conduct a test burning of Orinoco fuel to be supplied by Lagoven, S.A. Modifications will be made to the Dalhousie Unit No. 1 to accommodate the handling and burning of this special fuel, with funding provided by the Venezuelan company.

Since this fuel is about one-third higher in sulphur content in comparison to existing fuel oil normally used at Dalhousie No. 1, limestone injection will be required at the top of the combustion chamber in an effort to reduce emissions.

This project could, if successful, result in this heavy fuel becoming a potential economic alternative fuel for NB Power's existing oil-fuel units.

Status: Design and ordering of equipment for modifications to Dalhousie Unit No. 1 to enable handling, storage and burning of Orinoco fuel began in 1986. The test will begin in June 1988 with the project completion scheduled for June 1989.

Cost: $13.4 million

Funding: Lagoven, S.A.

Contact: C.T. Flynn, P. Eng., NB Power
506-458-4259

5.7.1.2 Circulating Fluidized Bed Demonstration Project

Objective: To demonstrate this technology on a utility system utilizing low grade fuels. A program of up to 8000 hours of burning over the next two years is currently scheduled. Fuels that will be burned include New Brunswick coal and oil shale, Nova Scotia coal, wood and woodwastes and also other contracted test burns on a cost recovery basis. One contracted test burn, contracted in 1987 involves petroleum coke. CONOCO Inc. has supplied the coke for a demonstrated burn to assess sulphur capture, carbon burnout, particulate and NOx emissions. This will be completed in early 1988. Following this, the facility will be available to perform tests on other

fuels and sorbents. It is anticipated that the facility will attract interest from other canadian and international parties, from which further test programs will develop.

Description: The construction of the new circulating fluidized bed at NB Power's Chatham generating station has been completed and is integrated with the existing 22 MW Unit No. 2 turbine/generator. The unit is to be used to demonstrate the combustion of fuel mixtures that will lower emissions. The technology promises up to 90% sulphur capture during the combustion process, thus enabling compliance with the federal government's new source performance guidelines.

Status: The CFB project construction was essentially completed in 1986 and the unit was accepted in the fall of 1987. The R & D test program will begin in 1987 and will run until July 31, 1990.

Cost: $33,000,000

Funding: Energy Mines and Resources Canada

Contact: C.F. Baird, NB Power
506-458-3058

5.7.1.3 Distributed-Mixing Coal Burner Development

Objective: To test a series of coal/limestone fuel mixtures using New Brunswick and Nova Scotia coals in a 1 MMBTU/hr test rig to determine optimum combinations of air, fuel and combustion rate variables to reduce NOx and SOx emissions.

Description: Distributed-mixing combustion of solid fuels has been developed in the U.S. and elsewhere as a means of retrofitting existing coal-fired boilers to reduce emissions of nitrogen oxides by as much as 50%.

Status: Phase I of the project was completed in August 1986. Preliminary arrangements were made in late 1987 and necessary approvals have been received for Phase II.

Cost: $256,000

Funding: Energy, Mines & Resources Canada

Contact: C.T. Flynn, P. Eng., NB Power
506-458-4259

5.7.1.4 Development of an On-Line Performance Monitoring System

Objective: To develop a real-time unit performance monitoring system on a coal-fired generating unit to provide information on plant efficiency and diagnostic capabilities.

Description: The system is a microprocessor-based data collection and analysis unit which accesses the plant operating data and provides feedback to operations on operating problems and the impact of design conditions. Analyses of certain areas of the cycle are provided to aid operator actions.

Status: Initiated January 1985, project on-going to demonstrate long-term reliability.

Current termination date is June 1989.

Funding: Joint Venture Project with EM&R, Canadian Applied Technology (CAT) and NB Power

Contact: R. Pickles, P. Eng., NB Power
506-458-3049

5.7.1.5 Retrofit Variable-Speed Drive to an ID Fan

Objective: To retrofit and evaluate the addition of a 600-volt drive system to a 4160-volt application.

Description: The existing induced-draft fan at the Chatham Coal/Oil Shale Demonstration project is powered at 4160 volts. This project will provide an alternate feed to that motor through a standard 600 volt variable speed drive using input and output transformers. The study aspects of the project will concentrate on harmonic effects and efficiency.

Status: Work is progressing on the purchase and installation of the equipment with testing to take place in early 1988. Completion is scheduled for December 1988.

Funding: $175,000 CEA
CEA Project #524G524

Contact: A. Gunn, P. Eng., NB Power
506-458-4230

5.7.1.6 Coal-Liquid Mixture Combustion - Charlottetown, P.E.I.

Objective: To determine the practicality of burning coal-water mixtures as a direct replacement for heavy fuel oil.

Description: This project is designed to investigate the practicality and effectiveness of burning Carbogel (coal-water) in a utility boiler originally designed to burn oil. The project will also demonstrate the feasibility of production and delivery of Carbogel in sufficient quantities for combustion. Further information to be gained from the project includes:

- transportation, storage and handling of Carbogel
- modifications to oil-fired boilers
- design of coal-water burners

- combustion efficiency
- economic data

NB Power's involvement includes the staffing of the Project Co-ordinator position. This person is also the Secretary to the Steering Committee.

Status: The contract for work was extended to March, 1988. The project is complete with the final report presently being assembled.

Cost: $8,800,000

Funding: Energy, Mines and Resources, Canada

Contact: D.M. Rankin, P. Eng., NB Power
506-458-4275

5.7.1.7 Scheduling of Major Thermal Power Plant Equipment Inspections

Objective: Review practices employed in the utility industry for the scheduling of major plant overhauls (eg. turbine generators) to provide economic benefits, reduce down-time and optimize overhaul practices.

Description: This state-of-the-art project is a joint effort between the Energy Conversion Group of the University of New Brunswick and NB Power. UNB will conduct the literature search, with NB Power providing technical assistance.

Status: Project started in July 1986, and was completed in September of 1987.

Funding: $25,000 CEA
CEA Project #610G562

Contact: J. Sturgeon, P. Eng., NB Power
506-458-4481

5.7.1.8 Electrical Testing of Thermally-Deteriorated Converter Transformer to Determine Remaining Electrical Strength

Objective: To evaluate the reduction in power transformer life as a result of continuous long-time overloading.

Description: Since 1983, NB Power has been involved in a change-out program of the converter transformers at the Eel River HVDC station following the failure of one unit. During repair following the fault, thermal degradation to both the valve and high-voltage windings was observed; even though the units had been in operation for only twelve years with a continuous overload of 10%.

Electrical testing was carried out by CGE at the Guelph Plant in September 1985. In general, the results were better than anticipated. As a result of these tests, the spare converter transformer was not rebuilt. This was a

saving to NB Power of about $400,000. Further testing of paper samples taken from the tested transformer during the rebuilding program has been completed.

Status: All testing was completed during the first quarter of 1987 and the final report has been drafted and is presently under review by NB Power staff.

Cost: $30,000

Funding: CEA - first $15,000 / balance by NB Power

Contact: M. N. Campbell P.Eng., NB Power
506-458-4220

5.7.1.9 Lightning Ground Flash Density Measurements In Canada

Objective: To conduct lightning ground flash density measurements in Canada.

Description: Many countries in the world have conducted extensive lightning ground flash density measurements and built up data banks to aid in the design of lightning protection. This project will undertake to perform a similar function across Canada using the CIGRE 10 kHz vertical aerial counter. NB Power is participating with CEA by setting up and monitoring the test sites in New Brunswick and providing a member to the Task Force guiding the project.

The results will more accurately define the isokeraunic levels across Canada and provide the basis for design parameters which could result in reduced transmission line costs without any loss in reliability.

Status: The lightning counters are scheduled for installation during the Spring of 1988, with measurements being taken over the lightning season.

Cost: Total project $360,500

Funding: $350,000 CEA, $10,500 NB Power
CEA Project #179T382

Contact: D. E. Clark P.Eng., NB Power
506-458-4085

5.7.1.10 Field Trials Of Galloping-Control Devices For Bundled Conductor Lines

Objective: To record the performance of a selected control device during galloping conditions.

Description: NB Power is a participating utility in this contract that CEA has with Ontario Hydro.

NB Power test site is on Line #3006 (Salisbury, NB to Onslov, NS). The control devices are on three spans on the section of line across the Tantramar Marsh, a location where six towers collapsed during ice storm in 1980, and as yet still unexplained as to the reason for the failure.

The type of control device on this 345 kV, 795 MCM ACSR bundled conductor line is a detuning pendulum. These can be seen from a provincial access road five miles north of the western exit to Sackville from the Trans Canada Highway.

Performance of spans with and without detuning pendulums will be recorded on 3 minute reels of 8 mm movie film. Sackville District personnel were trained by Ontario Hydro and given guidance on when to suspect galloping could occur.

NB Power is preparing an additional test site, having bundled conductors with vertical separation on Line 3006.

Status: Field tests began in November, 1986. Forecast to be completed at the end of 1988.

Cost:	Total Project cost	- $130,000
	Installation costs for NB Power portion	- $5,000

Funding: CEA
Contractor - Ontario Hydro
NB Power contributed the installation costs.
CEA Project #133T386

Contact: R.E. Haggerty, P. Eng., NB Power
506-458-4302

5.7.1.11 High Voltage D.C. Working Group - WG140 (Chairmanship)

Objective: To review current problems in the design, operation and maintenance of existing or planned facilities and recommend a plan of needed research. Upon acceptance of the plan, to draft the "Request for Proposal" for approval by the CEA R&D Transmission Committee.

Description: The Requests for Research Proposals are produced on the basis of prioritized needs after a review of inputs from the utilities, industry and the Transmission R & D Committee.

Active projects and position papers at any one time amount to approximately $250,000 per year.

Technical Advisors for the projects are recommended and results from the research work are reviewed for appropriate action.

Status: During 1987 the following action was taken:

a) 203T421 HVDC Wall Bushings - Temporarily Cancelled due to CEA cash flov problem
b) 210T422 HVDC Station Electromagnetic Environment - Completed
c) 212T506 Reliability Assessment of HVDC Configuration - Completed
d) 214T565 Field Tests/Performance Assessment of M.O. Gapless S.A. for 250 KVDC - Issued

Cost: Approximately $5,000 annually.

Funding: CEA Project #ST-241

Contact: Dr. T.H. Lee, P. Eng., NB Power
506-458-3245

5.7.1.12 Application of Herbicides to Control Unwanted Vegetation on Transmission Right-of-Way, Capsule Evaluation Program

Objective: To develop operational specifications and evaluate the application methods of Carbopaste/Roundup mixtures. Capsules are utilized and an appropriate injector will be determined.

Description: The application requirements of encapsulated herbicides for individual trees are to be studied. One particular type of herbicide is to be used. Various application methods with resulting effects are to be determined together with a treatment season.

Status: Two prototype injection tools have been manufactured. A first year evaluation of the effects of the herbicide using the first tool has been completed. A licence to manufacture and market the capsule system has been negotiated. The second year evaluation was completed in 1987. The third and last year (with NB Power involvement) will be during 1988.

Cost: $390,000

Funding: $217,000 CEA, $173,000 BC Hydro, $10,000 NB Power, (plus six additional utilities for their application costs)
CEA Project #173T517

Contact: W.M. Nason, P. Eng., NB Power
506-458-4367

5.7.1.13 Heat Pump Dehumidification Drying in a Fish Smokehouse

Objective: The purpose of this study is to carry out an economic and technical comparison of a dehumidification heat pump with the new propane smoking method as well as the traditional method.

Description: The drying and preservation of fish by smoking has been the traditional method for many years. The system is effective, but slow and permits variations in the final product quality.

Never techniques are being tried such as forced air circulation, injection of smoke from an exterior source and auxiliary heat requirements being provided by propane heaters.

This project will install and operate a dehumidification heat pump in a section of the smokehouse which will permit direct economic and technical comparisons with the other two methods.

Status: This Canadian Electrical Association study will be carried out by NB Power and Energy, Mines & Resources utilizing an existing smokehouse located in Cap Pele, New Brunswick.

The project has received a 4-6 month set-back due to fire in the host building. Rebuilding is currently underway and the project will recommence in early summer. The project duration is 12 months.

Cost: CEA: $35,000
EMR: $15,000

Funding: Canadian Electrical Association $35,000.
Energy, Mines & Resources $15,000
CEA Project # 608U556

Contact: R.E.C. Little, P. Eng., NB Power
506-458-4293

5.7.2 NOVA SCOTIA POWER CORPORATION

5.7.2.1 Accelerated Material Evaluation of Polymer Insulators for Transmission Lines

Objective: To evaluate the effect of pollution on polymer insulators in a salt fog environment.

Description: NSPC is participating in this CEA R&D Project undertaken by IREQ (Hydro-Quebec). Six polymer insulators of three makes, Ohio Brass Hi-Lite, Ceraver Armourlite and Rosenthal Roderflex were installed hot by NSPC on L-7011 in the Lingan area in November 1982. One unit of each make was equipped with a corona ring.

Status: All observations and data collection were completed in 1986. A final report has been delayed due to a fire at IREQ Lab and is now expected by June '88.

Cost: $229,230

Funding: Canadian Electrical Association (R&D Project No. 121-T-226).

Contact: W. Chappell, (NSPC).
902-876-7801

5.7.2.2 Application of Ion Chromatography To Chemical Analysis of the Steam/Water Cycle (CEA Project 535 G 535 awarded to N.S. Power Corp.)

Description: The importance of high-purity feedwater for maintaining the integrity of components of high-pressure steam plant has long been recognized. Present standards in terms of 1 ppb are amenable to instrumentation such as sodium ion analyzers and cation conductivity. These are effective only with specialist support staff on hand. The ion chromatograph overcomes the analytical problems in measuring low levels of sulphate and chloride. On-line instrumentation has been developed and is currently under evaluation. This project will seek to adapt a low-cost ion chromatograph for on-line use in high pressure thermal plant analytical systems.

Status: Initiated September 1985, scheduled completion December 1986. Final report was issued on 1987 03 03. CEA research report was printed and issued in June 1987. Further NSPC research on the project has continued in the areas of development of the software for Sperry (IBM compatible) personal computers, diagnosis of results and application of the ion chromatograph to look at other ionic groups. This system is now planned to be retrofitted to four NSPC thermal power plants. In addition, several other Canadian utilities have expressed interest in the system.

This CEA project is now complete.

Funding:	CEA R&D	$40,000
	NSPC	40,000
	TOTAL	$80,000

Contacts: A.J. Farmer (NSPC) Project Leader (902) 428-6869
P. Whitehouse (NSPC) Principal Investigator (902) 755-5811

5.7.2.3 Circulating Fluidized Bed (CFB) Feasibility Study

Objective: To study the feasibility of circulating fluidized bed boilers for utility application in the 150 MWe size range. Specifically, instrumentation and control systems will be investigated to prove safe start-up, load-following, and flexibility capabilities of the system. Additionally, studies on the feedstock preparation and injection, dust collection, and waste disposal will be conducted.

Description: NSPC is managing the study under the general guidance of the CFB Management Board. An assessment of the capabilities of various manufacturers to build CFBs sized at 150 MWe will be examined.

Status: Draft report dated 1986 01 31 has been completed. An expanded terms of reference was approved on 1986 10 22 to address related CFB technical issues.

Cost: $500,000 has been appropriated for salaries and expenses associated with the study.

Funding: Financial support will be provided through the offices of the Oil Substitution Committee.

Contact: I.D. Covill, (NSPC).
902-428-6625

5.7.2.4 Coal-Liquid Mixtures Conversion Feasibility Study

Description: As part of the Federally-funded ($8.8 million) coal-water fuel demonstration program currently underway and centered on a combustion demonstration on the No. 10 Unit of Maritime Electric's Charlottetown, P.E.I. Generating Station, NSPC undertook a paper study to evaluate the technical and economic problems/benefits of converting the 100 MW - No. 2 Unit at Tuft's Cove to coal-water fuel. Fenco-Shawinigan were commissioned to perform the study.

Status: Final report of the phase I study was received in May 1986. Due to the unattractive economics of coal-water fuels vs fuel oil, the phase II study (detailed analysis/work definition/cost estimates/etc.) was postponed pending final outcome of combustion testing on Maritime Electric's #10 Unit.

Contact: A.J. Neale, (NSPC).
902-428-6903

5.7.2.5 Control of Distribution Line Galloping (CEA Project No. 196 D 367, awarded to Ontario Hydro).

Objective: To obtain reliable observations of performance of promising control devices during galloping occurrences.

Description: NSPC is co-operating in this project. Two galloping-control devices, the air-flow spoiler and the detuning pendulum have been installed on a six-span section of line in the Cheticamp area. Eighteen air-flow spoilers, three per span, and six detuning pendulums, one per span, were installed on different phases. The remaining phase with no devices installed will be used as a reference. Interphase spacers were installed on four other spans along the same section of line making a total of 10 spans in the test.

These tests will determine the overall effectiveness of the control devices under natural galloping conditions, and provide recommendations on the application of these devices to eliminate or reduce the effects of galloping on existing and new distribution lines.

Status: A galloping occurrence was observed on 1986 01 22. A film of the occurrence was taken and sent to Ontario Hydro Research for analysis. One of the interphase spacers has failed. The failed unit was sent to Ontario Hydro Research. The project has been extended to the end of 1989 when a final report is expected. No galloping was reported on this line during 1987. Observer refresher sessions were conducted by Ontario Hydro in October 1987.

Funding: Material and monitoring equipment provided by Ontario Hydro under CEA contract. Control devices installed and monitored by NSPC.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.6 Evaluation of CCA-PEG Treated Scotch Pine Poles

Objective: To determine the acceptability of treatment from environmental and climbability points of view.

Description: 100 CCA-PEG treated Scotch Pine poles were installed in the Clare District. The poles were initially inspected in accordance with CSA Standards 015.3 and 080 for physical defects and preservative penetration and retention requirements. Hardness measurements were taken using a pilodyn penetrometer and the Linemen's climbability perception was recorded.

Water and soil samples were taken in the area around the poles to determine leachability of the preservative.

The results of these tests will be used to determine if this type of preservative treatment is environmentally acceptable and helps the climbability of the pole.

Status: Commenced in 1986, poles were tested initially in the Spring and for climbability, soil and water samples in mid-Summer. Poles will be tested and monitored through 1988.

In the fall of 1987, further tests were conducted with the Pilodyn Penetrometer, and a climbability survey of NSPC linemen was performed. Samples taken from the poles and soil around the poles were sent to the Victoria General Hospital Lab (Halifax) for anlaysis of the leaching of the preservative chemicals. The results of these tests will be used in environmental impact studies.

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.7 Field Testing of Distribution Equipment and Line Materials in a Marine Atmosphere

Objective: To evaluate corrosion of equipment in a marine atmosphere.

Description: A 25 kV line along Inverness Beach feeding summer cottages has been fitted with varous components such as cutouts, lightning arresters, epoxy arms, insulators, connectors, clamps, etc., to study the effect of salt contamination under normal operating conditions. This experience will assist in the evaluation and selection of suitable materials for construction of distribution lines in seacoast areas.

Thirty-three powder-coated distribution transformers have been purchased with a polyester finish. They are being installed in salt and industrial-polluted areas in Eastern and Western Zones. Three additional powder-coated transformers were installed in the Peggy's Cove - Prospect area as part of CEA R&D Project 78-94 awarded to B.C. Hydro.

Status: Powder-coated transformers were inspected, and evidence of rust was found on all transformers. The rust signs are quite evident at the bottom of the transformer tanks and near the transformer hanger brackets.

The powder-coated transformers were inspected in October 1987 by a representative of B.C. Hydro Research, who agreed with the earlier NSPC observations and conclusions concerning the severe rusting and corrosion. CEA R&D has been informed.

We have concluded that this type of paint does not provide adequate protection against corrosion due to salt contamination in our seacoast areas.

We are still evaluating material installed at Inverness Beach.

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.8 Field Testing of Insulators and Associated Equipment on 25 kV Distribution Lines in Coastal Salt Environment (CEA Project No. 081-D-557 Awarded to NSPC)

Objective: To evaluate the effectiveness of CSR (Controlled Surface Resistance) insulators, cutouts, arresters, and transformer bushings as well as stainless steel transformer tanks, various synthetic suspension insulators, and connectors.

Description: Purchase and install controlled surface resistance (CSR) glazed insulators, cutouts and arresters, synthetic deadend insulators, stainless steel transformers and various connectors. The equipment will be installed on a section of existing 25 kV line near Centreville, Digby County, N.S.

Performance of these insulators and equipment will be monitored and compared with the previous outage statistics of this line to determine the effectiveness of this equipment in salt-contaminated atmosphere.

The results will provide power utilities with much needed technical information to design and operate distribution lines in coastal areas with minimum interruptions due to salt contamination.

Status: Commenced in 1986, material has been received and installed. Line was energized at 25 kV on 87-05-13. Monitoring equipment has not yet (Dec. 1987) been received from IREQ. Three CSR-insulated cutouts have flashed over, and replaced by 150 kV BIL NSPC standard 25 kV cutouts installed on a special no-track epoxy mounting bracket.

The unpainted stainless-steel transformers are showing signs of rusting.

Funding: Material purchase and installation CEA funded. NSPC monitoring performance of equipment.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.9 Marginal Cost-Based Peak Load Pricing and Load Control Study

Objective: To investigate the applicability of marginal cost pricing, time of use pricing, modeling techniques for load and sales forecasting, load management and load research to a utility and to determine how these systems can lead to more efficient utilization of the utility's energy resources.

Description: The study comprises the following modules:

- Cost of Service Study
- Marginal Cost Study
- Load Research Study
- Rate and Load Management Experiments
- Load and Sales Forecasting Study
- Overall Cost Benefit Study

Status: All work has been completed and Final Report Volumes 2 through 7 have been issued. Volume 1 (Executive Summary) and Volume 8 (Cost/Benefit Study) will be issued early in 1988. The study has demonstrated the usefulness of load research data, experimented with water heater load management and developed analysis tools for evaluating demand side management programs.

Funding: Total of $3,225,000 funded 80% by Federal government and 20% by Province of Nova Scotia. Additional funding of $175,000 by the Oil Substitution and Conservation Agreement (EM&R) has been obtained to complete the project.

Contact: Jack Kiuru, (NSPC).
902-428-6172

5.7.2.10 Nova Scotia Add-On Plenum Heater Experiment

Objective: To test the application and effectiveness of dual-fuel systems, particularly oil and electric. This experiment will evaluate the capability of dual-fueled heating to reduce oil consumption while improving the utilization of coal-fired generation and reducing future peak loads.

Description: The add-on plenum electric heater installed in the supply duct or plenum of oil-fired hot air furnaces of 150 domestic residences allows this objective to be met while providing additional information on their cost effectiveness, convenience and acceptability to customers in Nova Scotia. An additional 100 domestic customers will have their furnace oil consumption monitored and serve as a control group to the basic study. The dual fuel concept will be expanded to include hot water and gas backup heat pump systems for approximately 15 commercial/institutional customers for the second phase of the experiment.

Status: The project was initiated in January of 1986 and the domestic field experiment is expected to be completed in August of 1988 with final reporting by February 1989. The domestic heaters and their associated control sites are being prepared for the current heating season. Installation of the first commercial sites began in November 1987.

Funding: Funding of $1,025,000 was provided by the Oil Substitution and Conservation Agreement.

Contact: Jim Kirby, (NSPC).
902-428-6664

5.7.2.11 Performance of Preservative-Treated White and Red Spruce Poles: Examination for Checking Toughness (CEA R&D Project 77-29A, awarded to Forinteck)

Description: Approximately 144 ACA-treated spruce poles have been installed in the Guysborough Area (Dickie Brook line). These poles were cut in 1977-78 from Hants County, Nova Scotia. Incisions were made along

the full length of the poles and full-cell treatment of ACA product was applied in accordance with CSA Standard O-80. The penetration depth averaged to 1.10 inches.

Examination of the poles carried out in 1981 showed incised poles as moderately checking and non-incised poles as severely checking. Hardware removed from some poles in 1984 showed signs of corrosion.

A common complaint from the linemen was the hardness of the poles and vertical splits making them difficult to climb.

Status: A report was prepared by Forinteck for the 1984 examination done on the poles.

The report recommended another examination be done in 4-5 years as part of continuing their long-term performance evaluation. NSPC will continue to monitor performance. Galvanized steel bolts installed on the poles, and inspected in 1987, showed severe corrosion and were replaced.

Funding: Poles and installation funded by NSPC. Inspection and report funded by CEA R&D.

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.12 Test Burn of Nova Scotia Coal and Limestone at Chatham CFB

Objective: To conduct a test program to burn Prince mine Coal and two limestones in the Circulating Fluidized Bed at Chatham, N.B.

Description: NSPC has selected coal from the Prince Mine as the most likely fuel for fluidized bed combustion and will in the near future select two potential limestones. This limestone selection will be based upon:

- Available reserves
- Transportation and quarrying costs
- Bench-scale tests of reactivity

A 1000-hour test program will be carried out at NB Power's Chatham CFB to combust the Prince Mine coal with the two potential limestones. Results of these tests will include:

- Process data which will permit calculation of carbon utilization, combustion efficiency, limestone utilization, sulphur capture, NO_x emissions and works power requirements.
- Erosion wear of test samples and fluid bed heat exchanger tubes.
- Substantial quantities of ash for subsequent testing by others.
- Qualitative observations of how the Prince Mine coal combusts versus other fuels including observed fuel-related material-handling problems.

Operation of the Chatham CFB and testing activities will be performed by NB Power staff. NSPC staff will manage the test and prepare all reports for the program.

Status: Funding approved, program under development. Test burns scheduled for May-June, 1988.

Funding: Shared equally by NSPC and Department of Supply and Services. NB Power to issue credits for electricity generated during test runs.

Contact: S.C. Fraser, NSPC (902) 428-6427.

5.7.2.13 Development of Effective Fish Bypass at Hell's Gate Hydroelectric Station Headpond, Black River Hydro System

Objective: Development of effective fish bypass around Hell's Gate station for juvenile alewife.

Description: A fish bypass structure was installed at the Headpond dam. A fish behavioural deterrent device ("hammer") developed by Ontario Hydro was installed in front of the station intake with the goal of redirecting the juvenile alewife from the intake to the fishway entrance. Testing of the effectiveness of the system was carried out in the fall of 1987.

Status: All testing was completed in the fall of 1987. More than 1,000,000 fish successfully used the system. A final report is to be produced in February, 1988.

Cost: 13 000

Funding: Nova Scotia Power funded the $13 000 and provided staff support for the project.

Contact: T.P. Toner (NSPC)
902-428-6744

5.7.2.14 Fish Diversion Studies at Annapolis Tidal Generating Station

Objective: Determine the temporal and spatial distribution of designated fish species as they migrate past the Annapolis Generating Station turbine. Test the preliminary success of behavioral devices to divert fish from the turbine intake.

Description: Hydro acoustic (Sonar) and net techniques were used to determine the presence and trajectory of fish approaching the turbine. Light an sound behavioral devices were tested as attractants and deterrents for adult and juvenile fish in both the summer and fall of 1987.

Status: All field work was completed in 1987. Preliminary results are very encouraging as the devices successfully redirected fish away from the turbine intake area. The report is to be completed in February, 1988.

Cost: $152 000

Funding: Tidal Power Corporation 145 500
Nova Scotia Power 6 500 and considerable staff support

Content: T.P. Toner (NSPC)
902-428-6744

5.7.2.15 Herbicide Capsule Evaluation Program

Objective: To evaluate the cost and efficiency of the herbicide capsule injection system to control various species of unwanted vegetation.

Description: Appropriate locations will be selected and three trees/species in each group of 10 trees will be injected with Glyphosate capsules. Results will be evaluated after two growing seasons.

Status: Injection tool and capsules have been received. First application is scheduled for Spring 1988. Completion scheduled for November 1989.

Funding: Capsules and tools provided by CEA R&D project 173 T 517A. Labour by NSPC.

Contact: Kevin Penny (NSPC)
902-876-7801

5.7.3 MARITIME ELECTRIC COMPANY, LIMITED

5.7.3.1 Wind Test Site - North Cape, P.E.I.

Description: This is a national facility available to Government and private industry for field testing of windmills. Laboratory facilities provide data acquisition for the determination of unit performance.

Status: Operation continues. One new unit has been installed, and will be tested in 1988. Modifications to a 500 kW unit to install a "high energy" rotor will be carried out, followed by testing. Testing continues on a hybrid wind-diesel system installed in 1987.

Funding: Site is operated by Resource Ventures Ltd. under long-term contract from the P.E.I. government with an annual operating grant from N.R.C.

MECL Involvement: MECL has agreed to purchase output on an "energy displacement" basis. MECL also provides technical assistance on an 'as required' basis.

Contact: J.A. Lea, (MECL).
902-566-1599

5.7.3.2 Coal-Liquid Mixture Combustion - Charlottetown, P.E.I.

Objective: To determine the practicality of burning coal-water mixtures as a direct replacement for heavy fuel oil in a compact oil-fired design utility boiler.

Description: This project is designed to assess the environmental acceptability and the effects on boiler performance in a boiler designed for oil. The project will also demonstrate the feasibility of production and delivery of Carbogel in sufficient quantities for combustion. Further information to be gained from the project includes:

- Transportation, storage and handling of Carbogel
- Modification to oil-fired boilers
- Design of coal-water burners
- Combustion efficiency

Status: Project 98% complete. Scheduled for completion in March 1988. Contract ends March 31, 1988. Last CWF burned September 23, 1987.

Cost: $8.8 million.

Funding: Energy, Mines and Resources Canada

Contact: J.L. Boomhower, (MECL).
902-566-1599

5.7.3.3 Farm Losses Resulting from Electric Service Interruptions

Objective: To obtain an evaluation of the direct and short-term costs incurred on farms as a result of local random supply interruptions.

Description: This project (CEA Project 309 U 403) is being carried out by the University of Saskatchewan and involves the selection of a representative sample of farmers across P.E.I., and forwarding a questionnaire to them.

Electrical consumption and cost for farms was also forwarded after approval was received.

Cost: $5,000.

Funding: Maritime Electric Company, Limited.

Status: Project completed. Report issued.

Contact: K.M. Montgomery
902-566-1599

5.8 SUMMARY OF CURRENT CEA R&D PROJECTS WITH UTILITY STAFF INVOLVEMENT

5.8.1 NEW BRUNSWICK POWER

NOTE RE CONTACT PERSON: (A) = Technical Advisor, (B) = Corresponding Technical Advisor, (C) = Task Force Member, (D) = Utility Evaluator, (E) = Utility Co-ordinator

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
143G299C	Modelling of Long-Range Transport & Acid Deposition - Lagrangian Model	$ 685,000	87-10	L.M. Burns (A) 506-458-3022
104G300	Flame Scanners for Coal-Fire Monitoring	$ 895,000	88-12	L.J.Griesbach (A) P. Eng. 506-458-3291
198G303B	Commercial EMAT for Boiler Tube Inspection	$ 195,000	87-07	W. Perrin (A) 506-458-3289
190G363	Brushgear Diagnostic Testing	$ 203,600	88-03	D.V. Tran (A) P. Eng. 506-458-3014
303G371C	Particulate Emissions from High Ashphaltene Fuel Flames	$ 950,000	87-05	R.E. Pickles (A) P. Eng. 506-458-3049
320G396	Calibration of Dye Dilution - Technique for Flow Measurement	$ 49,000	88-02	F.W. Davies (A) P. Eng. 506-458-3109
302G401	Optimization of Welding Procedures for Hydraulic Turbines	$ 150,000	88-08	F.B. Harriman (A) P. Eng. 506-363-3093
218G408C	Boiler Tube Erosion Evaluation	$ 292,600	88-08	B.A. Kennedy (B) P. Eng. 506-684-3387
325G430	Study of Characteristics of Two Phase Flow in Network Branches	$ 75,000	87-06	M. EL-Havary (A) P. Eng. 506-659-2102 506-458-3120
419G485	Robotic System for the In-Situ Repair of Hydraulic Turbine Runners	$ 620,000	89-02	F.B. Harriman (B) P. Eng. 506-363-3093

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
535G535	Application of Ion Chromatography to Chemical Control of Steam/Water Cycle	$ 80,000	87-06	C. MacNeil (A) 506-659-2102 506-458-3120
520G544	Acoustic Vibration of Piping Systems (Cancelled 1987 04)	$ 283,000	N/A	A. Nabuurs (B) P. Eng. 506-458-3045
634G568	Turbine Blade Repairs - Phase I	$ 300,000	88-03	G.J. Ross (B) P. Eng. 506-458-3019
143T250	Earth Resistivity, Canadian Soils	$ 133,500	88-02	J. Crousse (E) P. Eng. 506-458-4482
143T259	Battery Ground Locator	$ 39,600	88-06	K.A. Hooper (D) P. Eng. 506-458-4439
143T331	EMTP Program Developments (Phase A)	$ 1,736,000	87-12	W. Marshall (E) P. Eng. 506-458-3431
179T382	Lightning Ground Flash Density Measurements in Canada	$ 461,000	89-03	D.E. Clark (C) P. Eng. 506-458-4085
200T387	Powerline Carrier Radio Frequency to and from Radio Communication Services - Phase I	$ 200,000	89-07	Y.J. Picot (A) P. Eng. 506-458-3162
203T421	H.V.D.C. Wall Bushings	$ 245,800	87-05	M.N. Campbell (D) P. Eng. 506-458-4220
210T422	H.V.D.C. Converter Station Electromagnetic Environment	$ 225,260	87-10	Dr. T.H. Lee (D) P. Eng. 506-458-3245
207T483	Transmission Line and Station VHF Noise	$ 351,900	88-12	Y.J. Picot (D) P. Eng. 506-458-3162
243T484	Instrumentation for Grounding Measurements	$ 77,900	87-12	A.L. Gilliss (B) P. Eng. 506-458-4279
222T506	Reliability Assessment of H.V.D.C. Configurations	$ 72,570	87-09	Dr. T.H. Lee (D) P. Eng. 506-458-3245

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
260T507	Gas-In-Oil Analysis	$ 110,000	88-01	M.N. Campbell (B) P. Eng. 506-458-4220
252T531	Environmental Planning of Right-of-Way	$ 84,300	87-09	W.J. Borland (D) 506-458-3256
264T534	Investigation of Worker Reaction to H.V. Field Induced Transient Electric Currents	$ 18,780	88-06	R.J. Carr (E) 506-458-4370
214T565	Field Tests and Performance assessment of Metal Oxide Gapless Surge arrestors for 250 KV DC and above	$ 125,000	88-09	Dr. T.H. Lee (D) P. Eng. 506-458-3245
173T567	An Investigation of the Stability of Plant Communities on Transmission Line Rights-of-Way	$ 67,320	88-11	W.C. Bidlake (A) C.E.T. 506-458-3464
293T592	Epidemiological Studies of Incidences of Electric Shock	$ 45,000	88-11	R.J. Carr (E) 506-458-4370
294T622	Investigation of Low Frequency Inter-Area Oscillation Problems in Large Inter-Connected Power Systems - Phase I	$ 189,420	90-07	D.H. Thorne (A) P. Eng. 506-458-4438
180D579	Development of an Influence Vector for the Electrical Co-ordination of Power and Telecommunication System	$ 100,000	88-12	W.N. Snowdon (E) P. Eng. 506-458-4378
043D610	Optimum Metering Systems for Loads with High Harmonic Distortion	$ 30,920	88-09	S.W. Hayward (A) P. Eng. 506-458-3084
413U459	Applications of Water Heating	$ 83,000	87-06	R. Gulliver (A) 506-458-4279
649U587	Development of Retro-fitable Proportional Controls/Elements for Residential Central Heating and Low Energy Housing	$ 54,000	89-06	G.N. Dashner (A) 506-458-3285

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
711U615	Silicon Metal Production by Plasma Technology-Pilot Plant Study	$ 50,000	88-02	R.E.C. Little (B) P. Eng. 506-458-4293
716U629	Investigation of Electro-Osmosis and its Application	$ 20,000	88-09	R.E.C. Little (B) P. Eng. 506-458-4293

Work Groups, Task Forces and Advisory Panels

NUMBER	TITLE	COMPLETION DATE	CONTACT PERSON	FUNCTION
	Flue Gas Emission Control Advisory Panel	N/A	G. Gunter P. Eng. 506-458-4381	Member
614G-31	Review of Dust Suppression Techniques for Coal and Ash in Coal Fired Generating Stations	87-08	E.R. Pickles P. Eng. 506-458-3049	Technical Advisor
	Environmental and Advanced Combustion		E.R. Pickles P. Eng. 506-458-3049	Chairman
WG140	Working Group-HVDC and Static Var Compensator	N/A	Dr. T.H. Lee P. Eng. 506-458-3245	Chairman
			R.E. Haggerty P. Eng. 506-458-4302	Liaison Member
ST202A	Future Research From "Resistance to Oxidation of Reclaimed Transformer Oils"		M.N. Campbell P. Eng. 506-458-4220	Technical Evaluator
			R.E. Haggerty P. Eng. 506-458-4302	Liaison Member
ST205	Oil Preservation Systems for Power System Transformers	87-08	R.E. Haggerty P. Eng. 506-458-4302	R&D Trans. Committee Reviewer
ST259	Evaluation of Safe Working Clearances	87-08	P.R. Hickey P. Eng. 506-458-3189	Utility Co-ordinator
			R.J. Carr 506-458-4370	Utility Co-ordinator

ST272	Task Force-Electric and Magnetic Fields	88-04	J.V. Burnham 506-458-4388	Corresponding Technical Advisor
ST277	Safety Aspects of Conductor Buggies	87-03	P.R. Hickey P. Eng. 506-458-3189	Utility Co-ordinator
335U	Commercial Industrial Applications Task Force	N/A	R.E.C. Little P. Eng. 506-458-4293	Chairman

NOVA SCOTIA POWER CORPORATION

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
112G277	Internal Treatments of Desuperheaters to Prevent Exfoliation	$ 100,000	P.F. Stout (c)
431G294B	Investigation of Dry Deposition Fluxes	$ 617,000 $ 335,000 (C.F.)	O.J. Betancourt
104G300	Flame Scanners for Coal Fire Monitoring	$ 550,000 $ 200,000 (C.F.)	P.F. Stout (c)
318G394	Acid Deposition and Forest Damage in Canada	$ 135,000 $ 119,000 (C.F.)	O.J. Betancourt
218G408	Boiler Tube Erosion Evaluation	$ 292,600	I.D. Covill
309G409	Rockwell Combustor Program	$ 560,000 $ 140,000 (C.F.)	D.K. Blamire (c)
516G515	Coal Combustion Research	$ 300,000 $3,300,000 (C.F.)	I.D. Covill
634G568	Steam Turbine Blading Repairs	$ 300,000	W.C. Harris (e)
601G569	Review of Environmental Monitoring Equipment	$ 120,000	G.J. Lajeunesse (e)
702G606	In-situ Non-Destructive Inspection of High-Temperature Bolts	$ 30,000	W.C. Harris
703G607	Tightening Strain Measurement Techniques for High-Temperature Bolting	$ 30,000	W.C. Harris
712G619	Sorbent Injection for SO_2 Control	$ 37,000 $ 123,000 (C.F.)	D.K. Blamire
522G623	Development of an Expert System for Improved Steam Temperature Control in Coal-Fired Generating Stations	$ 60,000	A.J. Farmer
023T217	Simulation of Reradiation of Broadcast Signals by Power Lines	$ 115,131	H.F. McMullon

4434M

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
207T483	Transmission Line and Station VHF Noise	$ 286,949 $ 600 (C.F.)	H.F. McMullon
175T331	EMTP Development Coordination Group	$1,036,000 $5,964,000 (C.F.)	D.J. Mader
ST137	Position Paper on Lightning Performance of Transmission Lines Without Overhead Groundwires	$ 5,000	D.J. Mader (Author)
042T178	Development of an Arc Furnace Model	$ 60,000	R.W. Creighton
179T382	Lightning Ground Flash Density Measurements in Canada	$ 395,081 $ 60,000 (C.F.)	N. Creasy
173T517A	Herbicide Capsule Evaluation Program	$ 26,000	G.K. Penney (c)
608U556	Heat Pump Dehumidification Drying in a Fish Smokehouse	$ 35,000	J. Fraser
417U475	Development of Electric Element Arrays Operating at High Voltage	$ 120,000 $ 133,200 (C.F.)	J. Fraser (e)
507U526	Development of a National Sampling Plan for Canadian Utilities Revenue Meters	$ 25,000	B. Armstrong
714U628	Technological Impact of Superconductivity Above Liquid Nitrogen Temperature - Analysis of Opportunity Cases	$ 90,000 $ 90,000 (C.F.)	J. Fraser
538U558	Old Residential Circuit Breaker Tripping Characteristics	$ 50,300	F. Coolen (e)
647U588	The Application of Ultraviolet Lamps for Water Treatment or Sterilization	$ 25,000	J. Fraser (e)
805U	Plenum Heater - Dual Fuel Experiment	$ 7,000 $1,025,000 (C.F.)	J.E. Kirby (i)
320U564	Emerging Technologies Impacting on Electrical Needs by the Year 2020	$ 60,000	M. MacAlpine (e)

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
077D184	Application Guideline for Lightning Arresters	$ 370,000 $ 95,000 (C.F.)	D. Laking
109D355	Charge-Operated Fault Arc Diverter for Padmount Transformers	$ 120,000 $ 30,000 (C.F.)	H. Guilderson
125D373	Evaluation of Touch & Step Voltage in Underground Distribution Systems Part 3 (completed in 1987)	$ 72,000 $ 22,000 (C.F.)	L. Joudry
161D456	Application of Probabilistic Methods to Distribution System Design	$ 97,000	E. Vienneau
189D364	Y-Y Connections of 3-Wire Service Entrance by Means of Three Transformers (completed in 1987)	$ 385,000 $ 276,000 (C.F.)	F. Gallagher

Work Groups, Task Forces and Advisory Panels

	Flue Gas Emissions Control	D.K. Blamire Advisory Panel
	Acid Rain R&D Review	O.J. Betancourt Task Force
430U	5-Year Plan Task Force	J.C. Fraser Member
700U	Demand-Side Management Task Force	P.J. Elliott Member
WG223	Working Group on Power System Dynamics	R.W. Creighton Member
SD-4C	Std. Spec. for Deadend Polymer Insulators	D. Laking
SD-118	Utility Poles	K. Mathur

ABBREVIATIONS: C.F. - Co-funding
(c) - Corresponding T.A.
(e) - Evaluation
(i) - Project Interface

CEA R&D SUBCOMMITTEE MEMBERS

SUBCOMMITTEE	NB POWER	TEL. NO.	NSPC	TEL. NO.
Distribution	W.N. Snowdon	506-458-4378	C.J. Courtney	902-876-7801
Generation	E.R. Pickles	506-458-3049	I.D. Covill	902-428-6625
Transmission	R.E. Haggerty	506-458-4302	R.W. Creighton	902-428-6871
Utilization	R.E. Little	506-458-4293	J.C. Fraser (Chairman)	902-428-6876